



United States
Office of Personnel Management

FWS Job Grading Standard for

Plastic Fabricator

4352

Workforce Compensation and Performance Service
Classification Programs Division
December 1997, HRCD-4



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Classification Programs Division
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PLASTIC FABRICATOR

4352

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COVERAGE OF STANDARD

This standard is used to grade non-supervisory jobs that involve fabricating, modifying, repairing, and installing plastic items, parts, assemblies, and structures. The work requires a knowledge of the physical properties and working characteristics of plastics and compound ingredients; ability to use a variety of low pressure shaping, forming, and casting processes; skill in using casting and low pressure processing techniques such as potting, encapsulation, foaming, hand lay-up, thermoforming, and vacuum and pressure bag molding; skill in making master molds, patterns and form blocks, and in performing cutting and finishing operations.

WORK NOT COVERED

This standard does not cover the following work:

- Jobs primarily involved in planning and fabricating research and prototype models made from a variety of materials and used in scientific, engineering, developmental, experimental, and test work (See [Modelmaking Series, 4714](#));
- Jobs primarily involved in fabricating visual displays, exhibits, and training devices from a variety of materials such as wood, metal, plastic, plaster, etc. (See [Exhibits Making Series, 4715](#));
- Jobs primarily involved in the planning, layout and construction of patterns and core boxes for foundry operations or in the manufacture of wood or wood substitute form, blocks (See [Patternmaking Series, 4616](#), or [Form Block Making Series, 4654](#), as appropriate);
- Jobs primarily involved in the set up and operation of molding equipment for the manufacture of plastic part's and items (See [Plastic Molding Equipment Operating Series, 4351](#)).

TITLES

Jobs covered by this standard at the grade 10 level and above are to be titled *Plastic Fabricator*.

Jobs with assignments below grade 10 are to be titled *Plastic Worker*.

GRADE LEVELS

The standard does not describe all possible levels at which jobs may be established. If jobs differ substantially from the skill, knowledge, and other work requirements described in the grade levels of this standard, they may warrant grading either above or below these grades.

HELPER AND INTERMEDIATE JOBS

Helper and intermediate plastic fabricator jobs are covered by job grading standards for Trades [Helper](#) and [Intermediate](#) Jobs. (In applying the Intermediate Job Grading Table, the grade level of the target job should be used as the "journey level grade." Thus the "journey level grade" could conceivably be grade 9, 10, or 11 depending upon the level of the skill, knowledge and other work requirements of the target job.)

NOTE TO USERS

The following comparisons are provided to assist in distinguishing between Plastic Fabricating, 4352, and Plastic Molding, 4351 work:

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1. Skills and knowledges involve performing a variety of operations in fabricating, modifying, and repairing plastic items. For example; using woodworking equipment for cutting, machining, and finishing plastics; making molds, patterns, and forms from wood plastic, plaster, rubber, and clay and low pressure shaping and forming techniques.
2. Typically the molds are made of any of a variety of materials such as wood, clay, and plaster, plastic, and rubber when curing requires little (up to 400 psi) or no pressure.
3. Repair and finishing operations may involve trimming excess material, machining, drilling, reaming, bonding, bolting, and final assembly of parts and components.

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1. Skills and knowledges relate primarily to molding equipment setup and operation for high speed, volume production manufacture of plastic parts and items.
2. The molds are usually made of metal or metal or metal alloys in order withstand internal pressure of up to 4000 or 5000 psi and high volume production.
3. Finishing operations are typically limited to the use of hand tools to remove excess material from final parts

4352-7**PLASTIC WORKER, GRADE 7****4352-7**

General: The grade 7 plastic workers use preconstructed jigs, molds and form blocks to fabricate, repair and install plastic parts and structures where the presence of a few imperfections such as pits and bubbles will not affect the serviceability of the final product. They follow specific instructions and use established methods, processes and techniques to accomplish such routine assignments as hand lay-up and repair of regularly shaped laminated engine case coverings, domes, sinks, deck housings; pouring of liquid plastic compounds into molds; shaping, cutting, drilling, and installing plastic aircraft canopies and windshields.

Skill and Knowledge: Grade 7 plastic workers apply a general knowledge of the physical properties and working characteristics of a few common types of plastic resins and sheet stock as polyesters, epoxies, acrylics, and vinyl in conjunction with a practical understanding of the effect of the chemical reaction between resins and other compound ingredients such as catalysts, fillers, retardants, pigments and reinforcing materials in accomplishing routine manufacture, installation and repair assignments. They know the use, preservation and storage needs of the resins, compound agents, solvents, and cleaning and parting agents specified in instructions and are skilled in weighing, mixing and blending the ingredients together by hand or machine in proper sequence and proportions.

At grade 7, plastic workers are able to calculate surface and volume dimensions in order to determine the amount of compound and reinforcement materials needed based upon specific manufacturer or shop instructions. Using templates and forms as guides, they skillfully mark, cut, and trim materials such as pre-impregnated plastics, sheet stock, fiberglass cloth, foam and honeycomb to dimensions given in simple drawings or work orders. They follow prescribed procedures requiring knowledge of standard low pressure forming, shaping, and casting procedures. They are skilled at applying this knowledge to setup and provide for the proper manufacture and repair of plastic parts and structures using preconstructed jigs, molds, and form blocks. For example, these techniques may include spray-up and hand lay-up of regularly shaped fiberglass reinforced parts, drape, vacuum snap-back, vacuum and pressure bag molding; dipping and encapsulation; foaming; and casting and potting methods. They are also familiar with a variety of curing and annealing processes for plastics compounds and adhesives, for example, curing at room temperature or using infra-red heat, heat lamps, sunheat or curing ovens. They select cure times, temperatures and pressures by reference to specific instructions.

The grade 7 plastic workers use established procedures to repair regularly shaped laminated and transparent plastic items the contours of which are relatively intact and have been burned, scratched, contaminated by moisture or otherwise damaged. They know how to examine parts and items to locate defects. They are able to prepare defective surfaces for successive operations by sanding, scraping, and applying prepared solvents and cleaning agents. Within prescribed limitations, they smooth or remove scratches, dents, depressions, and uneven surfaces. They remove defective layers of reinforcement. Using repair techniques such as the scarf and step joint methods, they skillfully restore the strength of the structural components. They are skilled in

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removing excess resin and in performing other final operations such as trimming, sanding, routing, and installing. They know how to use preconstructed molds and form blocks to manufacture, usually on a production basis, a variety of plastic parts or items. For example, they know how to clean and prepare mold surfaces with release agents; how to coat items with protective plastic compounds by dipping or brushing; how to pour or inject liquid compounds into voids and available molds; how to bond plastic to plastic and plastic to metal articles; how to cut plastic sheet and tube stock according to simple specifications or templates; how to finish manufactured parts by sanding, filing and trimming.

At this level, plastic workers are skilled in handling and setting up appropriate molding, forming, and curing equipment such as wood, and fiberglass lay-up forms, potting and matched molds, vacuum and air pressure forms and lines, jigs and holding devices, heat lamps and curing ovens. They are able to use measuring instruments such as balance and gram scales for weighing resins and other compound ingredients; moisture indicators and optical micrometers for detecting and measuring depths of damaged areas; and rulers, squares, forms and templates to measure materials and mark citing and trimming lines. They know how to use scissors, shears, knives, and power saws to cut and trim materials. In addition they use rivet guns, drills, files, squeegees and rollers to accomplish fabrication and final installation operations.

Responsibility: Grade 7 plastic workers receive work assignments in the form of specific oral or written instructions accompanied by sketches or easily understood blueprints that show what is to be done and the materials to be used. They select the techniques, tools and equipment, and specified materials commonly used to do the assigned work. They notify the supervisor or higher graded worker when they encounter problems such as large numbers of air bubbles, pitting, warpage or delamination after having used standard methods and techniques. Work may be spot-checked in progress and is reviewed upon completion to see that it meets acceptable standards.

Physical Effort: Grade 7 plastic workers frequently stand, stoop, bend, kneel, reach and work in tiring and uncomfortable positions. They frequently lift and carry materials and equipment that weigh up to 10 pounds and occasionally up to 50 pounds.

Working Conditions: Usually the work is done inside in heated and well-lighted areas, although occasionally the plastic workers may work in unheated buildings or outside in all types of weather conditions. They are frequently exposed to loud noise, dust, fumes, toxic and/or potentially flammable and explosive chemicals which can cause skin, eyes, and lung irritations. In addition, they are exposed to the possibility of cuts, bruises, burns, and occasionally to falls when working on platforms or climbing ladders. To minimize or eliminate the effects of these conditions, the plastic workers follow numerous safety practices and wear or use various protective devices such as aprons, gloves and protective creams to help guard against skin

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irritations caused by resins, catalysts, solvents and other chemical compounds used; ear plugs or phones to lower noise caused by power equipment; fans, respirators and waterfalls to protect against dust, vapors and fumes in air; numerous safety practices in operating tools and equipment and storing and mixing potentially explosive chemicals. These devices may be uncomfortable, especially if worn for long periods of time.

4352-9**PLASTIC WORKER, GRADE 9****4352-9**

General: Grade 9 plastic workers repair, modify, fabricate, and install plastic parts and structures that have contours which must be reestablished; that must meet rigid mechanical or electrical tests; that require the manufacture of a mold using available part or pattern; or that have other features that make planning and accomplishment of manufacture and repair processes more difficult than those described at the 7 level. They use standard trade practices, processes and techniques to accomplish assignments that may involve fabrication of partial backup molds to make major repairs of laminated structures, such as microwave radomes, fairings, wingtips; initial layout and hand lay-up of multi-contoured plastic and fiberglass parts; and the manufacture of simple molds from plastic, plaster or rubber tooling compounds for successive casting, molding and foaming operations when the part or a pattern is available.

Skill and Knowledge: Grade 9 plastic workers have a greater knowledge than grade 7 workers of the working characteristics and properties of the same types of plastic materials named at the lower level, as well as such plastic and elastomeric tooling compounds as silicones, polyurethanes, plastisol vinyl and flexible epoxies. They are more skilled in varying the proportions of plastic and synthetic rubber resins and other compound ingredients used in order to obtain required working properties through consideration of factors such as size of item, effect of temperature and humidity conditions on setup time, acceptable pot life requirements, and the penetrability by different viscosities of compounds through various weaves and thicknesses of reinforcement materials. They know the compatibility of commonly used resins, release agents and surface parting compounds, and are more skilled in avoiding problems such as air bubbles and pitting caused by the use of improper mixing and pouring techniques.

At this level, the plastic workers apply a broader knowledge of and skill in using low pressure shaping, forming, and casting techniques than grade 7 workers. For example, they plan and accomplish repair and manufacture of laminated items with more complicated and varied shapes, or damaged contours, or for which there may be a need to manufacture molds from a variety of materials such as plastic, plaster and synthetic rubber tooling compounds. They know how to make partial backup molds to reestablish proper contours of a damaged item; for example, they hand lay-up laminated female and/or male molds on an identical section of a serviceable part to obtain proper configurations. They are able to lay out and accomplish initial hand lay-up of laminated items on molds with sharp, irregular angles and combinations of curved and flat areas. This requires greater skill than is necessary at grade 7 in layout, proper reinforcement of angles and corners, and in the use of hand tools to accomplish lay-ups free of blisters, resin pockets, starved areas, wrinkles and voids. They are skilled in making flexible and rigid casting and potting molds from materials such as plastic and rubber tooling compounds using an available master part or pattern. For example, they make flat-back one piece, split one-piece, shelled flexible casting molds, and male, female and two-part laminated molds. They prepare lay-up boxes, mark parting lines and alignment points, and determine the location of and cut sprue and vent holes. At this level, they use a more extensive knowledge of the effects of forming, molding,

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shaping and curing processes on plastics to identify problems such as warpage of manufactured parts, voids, pin holes, pin bubbles, poor lamination results, adhesion of part to molds, crazing and incomplete cure; determine probable causes; and make necessary corrections and adjustments to cure times, temperatures and pressures, or mixing, deration and pouring techniques.

At this grade level, plastic workers are more skilled in reading, interpreting and applying directions related to the mixture, ratios, possible uses, and required cure times, temperatures and pressures of common plastic resins, compound materials, solvents and mold release agents than grade 7 workers. They are also more skilled in reading dimensions and sizes in drawings and blueprints to make templates used in marking, cutting and trimming of final products. In addition, they use the same types of equipment as are described at the grade 7 level, however they are more skilled in using them to meet more rigid appearance, thickness, shape, finish and test requirements.

Responsibility: The supervisor assigns work orally or through work orders accompanied by appropriate drawings or blueprints. The grade 9 workers must use more judgment in planning their work and determining equipment, procedures and sequence of operations. They determine the ratio of resin to compound ingredients, the cure cycle and equipment needed, and the proper repair and moldmaking techniques to be used. They are responsible for determining the cause of rejects, and for making corrections. The products of their work must meet more stringent requirements for size, appearance, proper contours and required mechanical and electrical properties than those at the 7 level. At this grade, they work with greater independence than the grade 7 workers in that their work is normally checked by the supervisor and/or a quality controller only after completion for conformance with job specifications and use of standard trade practices.

Physical Effort: Physical effort at this grade is the same as that described at [grade 7](#).

Working Conditions: Working conditions at this grade are the same as those described at [grade 7](#).

4352-10**PLASTIC FABRICATOR, GRADE 10****4352-10**

General: At this level, plastic fabricators develop templates, patterns, molds and form blocks in order to modify and fabricate plastic items, assemblies and models that have combined straight and curved surfaces, and that may be made of a number of interconnecting parts and components. The work at this level is more difficult to plan and lay out than at the 9 level because of the more numerous curves, angles and shapes, and the need to fabricate patterns and form blocks for the various interconnecting parts comprising the final items. The plastic fabricators use any of the accepted trade practices, processes and techniques to accomplish work assignments that may involve manufacturing scale and full-sized plastic models of weapons, mines, tanks, air and space craft, dummies and gas masks for training and demonstration purposes.

Skill and Knowledge: Grade 10 plastic fabricators apply a more indepth knowledge of the working characteristics of a wide range of plastics materials, as well as woods, rubbers, clays and plaster tooling compounds in order to determine and select or substitute the materials to be used in the manufacture of master patterns, molds and final items. Overall considerations involved in the selection of materials are dimensional and optical qualities desired and a need for efficient and economical production. For example, they determine what type of plastic, rubber, clay or plaster compound is needed based on temperature, cure, weight, compatibility, flexibility and time considerations; and what type, weight, density, weave and number of plies of reinforcement to use to obtain strength, stiffness, drape and bulk properties of molds and final parts.

The plastic fabricators at this level apply a thorough knowledge of the full range of low pressure shaping, forming and casting techniques in order to plan and layout plastic models, items and assemblies and to reproduce scale models of objects. For example, they interpret and check plans, blueprints and sketches; visualize the completed model or assembly; determine the type, shape and number of molds, form blocks and master patterns needed; select appropriate equipment and techniques; and plan the sequence of work. They are skilled in using segment and laminated methods of construction of wooden form blocks with curved, contoured surfaces for successive lay-up and/or thermoforming processes; cast and laminated techniques of fabricating plastic and rubber molds such as shelled multipiece molds requiring careful planning to insure proper joining of the sections and parting of the shell from the mold; and machining of wood and plastic sheet and tube stock. They select the most economical methods of mold construction and take steps to eliminate problems such as extreme undercut and high mass to thin pour situations. They know how to finish and smooth the master patterns to required dimensions, as well as how to fit and assemble fabricated parts by nailing, bonding, bolting, and inserting into proper position.

The grade 10 plastic fabricators are more skilled in the use of shop geometric and trigonometric formulas to calculate angles, radii, contours, center lines, surfaces and solids when laying out work than grade 9 workers. In addition, they are skilled in interpreting more complex blueprints, diagrams and in using a wide range of manufacturers' instructions and specifications in order to select or substitute plastics materials.

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The grade 10 plastic fabricators must be more skilled than grade 9 workers in marking and measuring master patterns and templates using scribes, dividers, protractors, squares and micrometers. In addition, they must be skilled in the setup and skillful operation of a variety of wood working equipment such as lathes, routers and milling machines, as well as the low pressure forming, molding and shaping tools and equipment described at the next lower level.

Responsibility: Grade 10 plastic fabricators receive assignments through work orders, plans, specifications and drawings. They work with greater independence than grade 9 workers in planning and laying out their work; devising needed patterns, forms and molds; planning sequence of operations; and selecting appropriate materials, tools and equipment, and techniques with a view toward using the most efficient and economical means possible. Completed work is subject to spot-check by the supervisor for use of acceptable standards of workmanship and conformance with specifications.

Physical Effort: Physical effort is the same as that described at [grade 7](#).

Working Conditions: Working conditions are the same as those described at [grade 7](#) except that the work at this level is typically performed in well heated and lighted shops, and the fabricators are not usually exposed to the possibility of falls.

4352-11**PLASTIC FABRICATOR, GRADE 11****4352-11**

General: At this level plastic fabricators plan, layout, modify and fabricate unconventional, one-of-a-kind plastic items for a one-time project or in support of experiment, developmental or testing activities with a minimum of supervision. They may work in close coordination with scientists, engineers, and doctors in determining the most feasible materials and means of manufacturing the items that typically consist of numerous compound curves and intersecting compound angles. Assignments, that may involve manufacturing prototype models of radomes, missiles, wings, ship hulls and full body casts, are more difficult to plan and layout than those at the 10 level due to the need to meet more complex and critical configurations and fits, and the need to adapt trade practices, methods and techniques to fit each new situation.

Skill and Knowledge: At this grade level plastic fabricators apply a thorough practical knowledge of the newest plastics and possible compound materials in order to recommend and/or select materials to be used for prototype and one-time items that usually require special or unusual physical or functional characteristics, such as extremely light weight products, minute detail reproduction, very high heat resistance combined with excellent machinability. They may experiment with different combinations and amounts of resins and other compounds materials, as well as with different cure cycles and temperatures in order to obtain the required characteristics for the final product. In comparison, grade 10 plastic fabricators are skilled in selecting materials based upon the information provided by manufacturers' instructions and specifications. In addition, grade 11 plastic fabricators must have an extensive knowledge of the properties and machining characteristics of a variety of tooling materials such as woods, plasters, clay and rubber compounds in the selection of material to be used in the moldmaking processes.

In comparison with the grade 10 plastic fabricators who use any of the accepted manufacturing methods and techniques, plastic fabricators at this grade level must adapt shop practices, methods and procedures, and use unorthodox processes to fit each new project. They are skilled at establishing manufacturing procedures for newly developed compound materials through experimenting with various manufacturing techniques, curing times, temperatures; and pressures. They are able to recommend changes to suggested methods of manufacture in order to simplify the manufacturing process, improve the functional characteristics of the item, and establish realistic fabrication requirements. They are able to plan and layout items with hard to define reference points and are skilled in manufacturing master patterns and molds with critical compound curves and intersecting compound angles.

In addition to skill requirements of plastic fabricators at lower levels pertaining to shop mathematics, plastic fabricators at this grade level must be able to use mathematics to calculate loads, fits, sizes, and weights not provided in instructions and blueprints, to overcome design flaws, and to layout more complex items.

The grade 11 plastic fabricators know how to make special jigs and holding fixtures for holding, machining and curing irregularly shaped parts. In addition, they are more skilled in the setup and

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operation of trade tools, equipment and measuring instruments described at the 10 level to fabricate more complex items to closer tolerances.

Responsibility: While the grade 10 plastic fabricators are responsible for determining the (best accepted method by which to accomplish prescribed tasks and their work is spot-checked to insure use of such methods and techniques, the grade 11 plastic fabricators operate with greater independence. Grade 11 plastic fabricators receive assignments that specify the desired final product, and are expected to use originality and ingenuity in devising changes to methods, materials and processes to solve fabrication, assembly, design and related problems. Their work is reviewed by the supervisor on the basis of meeting assigned objectives.

Physical Effort: Physical effort is the same as that described at [grade 7](#).

Working Conditions: Working conditions are the same as those described at [grade 10](#).

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COVERAGE OF STANDARD

This standard is used to grade non-supervisory jobs that involve fabricating, modifying, repairing, and installing plastic items, parts, assemblies, and structures. The work requires a knowledge of the physical properties and working characteristics of plastics and compound ingredients; ability to use a variety of low pressure shaping, forming, and casting processes; skill in using casting and low pressure processing techniques such as potting, encapsulation, foaming, hand lay-up, thermoforming, and vacuum and pressure bag molding; skill in making master molds, patterns and form blocks, and in performing cutting and finishing operations.

WORK NOT COVERED

This standard does not cover the following work:

- Jobs primarily involved in planning and fabricating research and prototype models made from a variety of materials and used in scientific, engineering, developmental, experimental, and test work (See [Modelmaking Series, 4714](#));
- Jobs primarily involved in fabricating visual displays, exhibits, and training devices from a variety of materials such as wood, metal, plastic, plaster, etc. (See [Exhibits Making Series, 4715](#));
- Jobs primarily involved in the planning, layout and construction of patterns and core boxes for foundry operations or in the manufacture of wood or wood substitute form, blocks (See [Patternmaking Series, 4616](#), or [Form Block Making Series, 4654](#), as appropriate);
- Jobs primarily involved in the set up and operation of molding equipment for the manufacture of plastic part's and items (See [Plastic Molding Equipment Operating Series, 4351](#)).

TITLES

Jobs covered by this standard at the grade 10 level and above are to be titled *Plastic Fabricator*.

Jobs with assignments below grade 10 are to be titled *Plastic Worker*.

GRADE LEVELS

The standard does not describe all possible levels at which jobs may be established. If jobs differ substantially from the skill, knowledge, and other work requirements described in the grade levels of this standard, they may warrant grading either above or below these grades.

HELPER AND INTERMEDIATE JOBS

Helper and intermediate plastic fabricator jobs are covered by job grading standards for Trades [Helper](#) and [Intermediate](#) Jobs. (In applying the Intermediate Job Grading Table, the grade level of the target job should be used as the "journey level grade." Thus the "journey level grade" could conceivably be grade 9, 10, or 11 depending upon the level of the skill, knowledge and other work requirements of the target job.)

NOTE TO USERS

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1. Skills and knowledges involve performing a variety of operations in fabricating, modifying, and repairing plastic items. For example; using woodworking equipment for cutting, machining, and finishing plastics; making molds, patterns, and forms from wood plastic, plaster, rubber, and clay and low pressure shaping and forming techniques.
2. Typically the molds are made of any of a variety of materials such as wood, clay, and plaster, plastic, and rubber when curing requires little (up to 400 psi) or no pressure.
3. Repair and finishing operations may involve trimming excess material, machining, drilling, reaming, bonding, bolting, and final assembly of parts and components.

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1. Skills and knowledges relate primarily to molding equipment setup and operation for high speed, volume production manufacture of plastic parts and items.
2. The molds are usually made of metal or metal or metal alloys in order withstand internal pressure of up to 4000 or 5000 psi and high volume production.
3. Finishing operations are typically limited to the use of hand tools to remove excess material from final parts

4352-7**PLASTIC WORKER, GRADE 7****4352-7**

General: The grade 7 plastic workers use preconstructed jigs, molds and form blocks to fabricate, repair and install plastic parts and structures where the presence of a few imperfections such as pits and bubbles will not affect the serviceability of the final product. They follow specific instructions and use established methods, processes and techniques to accomplish such routine assignments as hand lay-up and repair of regularly shaped laminated engine case coverings, domes, sinks, deck housings; pouring of liquid plastic compounds into molds; shaping, cutting, drilling, and installing plastic aircraft canopies and windshields.

Skill and Knowledge: Grade 7 plastic workers apply a general knowledge of the physical properties and working characteristics of a few common types of plastic resins and sheet stock as polyesters, epoxies, acrylics, and vinyl in conjunction with a practical understanding of the effect of the chemical reaction between resins and other compound ingredients such as catalysts, fillers, retardants, pigments and reinforcing materials in accomplishing routine manufacture, installation and repair assignments. They know the use, preservation and storage needs of the resins, compound agents, solvents, and cleaning and parting agents specified in instructions and are skilled in weighing, mixing and blending the ingredients together by hand or machine in proper sequence and proportions.

At grade 7, plastic workers are able to calculate surface and volume dimensions in order to determine the amount of compound and reinforcement materials needed based upon specific manufacturer or shop instructions. Using templates and forms as guides, they skillfully mark, cut, and trim materials such as pre-impregnated plastics, sheet stock, fiberglass cloth, foam and honeycomb to dimensions given in simple drawings or work orders. They follow prescribed procedures requiring knowledge of standard low pressure forming, shaping, and casting procedures. They are skilled at applying this knowledge to setup and provide for the proper manufacture and repair of plastic parts and structures using preconstructed jigs, molds, and form blocks. For example, these techniques may include spray-up and hand lay-up of regularly shaped fiberglass reinforced parts, drape, vacuum snap-back, vacuum and pressure bag molding; dipping and encapsulation; foaming; and casting and potting methods. They are also familiar with a variety of curing and annealing processes for plastics compounds and adhesives, for example, curing at room temperature or using infra-red heat, heat lamps, sunheat or curing ovens. They select cure times, temperatures and pressures by reference to specific instructions.

The grade 7 plastic workers use established procedures to repair regularly shaped laminated and transparent plastic items the contours of which are relatively intact and have been burned, scratched, contaminated by moisture or otherwise damaged. They know how to examine parts and items to locate defects. They are able to prepare defective surfaces for successive operations by sanding, scraping, and applying prepared solvents and cleaning agents. Within prescribed limitations, they smooth or remove scratches, dents, depressions, and uneven surfaces. They remove defective layers of reinforcement. Using repair techniques such as the scarf and step joint methods, they skillfully restore the strength of the structural components. They are skilled in

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removing excess resin and in performing other final operations such as trimming, sanding, routing, and installing. They know how to use preconstructed molds and form blocks to manufacture, usually on a production basis, a variety of plastic parts or items. For example, they know how to clean and prepare mold surfaces with release agents; how to coat items with protective plastic compounds by dipping or brushing; how to pour or inject liquid compounds into voids and available molds; how to bond plastic to plastic and plastic to metal articles; how to cut plastic sheet and tube stock according to simple specifications or templates; how to finish manufactured parts by sanding, filing and trimming.

At this level, plastic workers are skilled in handling and setting up appropriate molding, forming, and curing equipment such as wood, and fiberglass lay-up forms, potting and matched molds, vacuum and air pressure forms and lines, jigs and holding devices, heat lamps and curing ovens. They are able to use measuring instruments such as balance and gram scales for weighing resins and other compound ingredients; moisture indicators and optical micrometers for detecting and measuring depths of damaged areas; and rulers, squares, forms and templates to measure materials and mark citing and trimming lines. They know how to use scissors, shears, knives, and power saws to cut and trim materials. In addition they use rivet guns, drills, files, squeegees and rollers to accomplish fabrication and final installation operations.

Responsibility: Grade 7 plastic workers receive work assignments in the form of specific oral or written instructions accompanied by sketches or easily understood blueprints that show what is to be done and the materials to be used. They select the techniques, tools and equipment, and specified materials commonly used to do the assigned work. They notify the supervisor or higher graded worker when they encounter problems such as large numbers of air bubbles, pitting, warpage or delamination after having used standard methods and techniques. Work may be spot-checked in progress and is reviewed upon completion to see that it meets acceptable standards.

Physical Effort: Grade 7 plastic workers frequently stand, stoop, bend, kneel, reach and work in tiring and uncomfortable positions. They frequently lift and carry materials and equipment that weigh up to 10 pounds and occasionally up to 50 pounds.

Working Conditions: Usually the work is done inside in heated and well-lighted areas, although occasionally the plastic workers may work in unheated buildings or outside in all types of weather conditions. They are frequently exposed to loud noise, dust, fumes, toxic and/or potentially flammable and explosive chemicals which can cause skin, eyes, and lung irritations. In addition, they are exposed to the possibility of cuts, bruises, burns, and occasionally to falls when working on platforms or climbing ladders. To minimize or eliminate the effects of these conditions, the plastic workers follow numerous safety practices and wear or use various protective devices such as aprons, gloves and protective creams to help guard against skin

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irritations caused by resins, catalysts, solvents and other chemical compounds used; ear plugs or phones to lower noise caused by power equipment; fans, respirators and waterfalls to protect against dust, vapors and fumes in air; numerous safety practices in operating tools and equipment and storing and mixing potentially explosive chemicals. These devices may be uncomfortable, especially if worn for long periods of time.

4352-9**PLASTIC WORKER, GRADE 9****4352-9**

General: Grade 9 plastic workers repair, modify, fabricate, and install plastic parts and structures that have contours which must be reestablished; that must meet rigid mechanical or electrical tests; that require the manufacture of a mold using available part or pattern; or that have other features that make planning and accomplishment of manufacture and repair processes more difficult than those described at the 7 level. They use standard trade practices, processes and techniques to accomplish assignments that may involve fabrication of partial backup molds to make major repairs of laminated structures, such as microwave radomes, fairings, wingtips; initial layout and hand lay-up of multi-contoured plastic and fiberglass parts; and the manufacture of simple molds from plastic, plaster or rubber tooling compounds for successive casting, molding and foaming operations when the part or a pattern is available.

Skill and Knowledge: Grade 9 plastic workers have a greater knowledge than grade 7 workers of the working characteristics and properties of the same types of plastic materials named at the lower level, as well as such plastic and elastomeric tooling compounds as silicones, polyurethanes, plastisol vinyl and flexible epoxies. They are more skilled in varying the proportions of plastic and synthetic rubber resins and other compound ingredients used in order to obtain required working properties through consideration of factors such as size of item, effect of temperature and humidity conditions on setup time, acceptable pot life requirements, and the penetrability by different viscosities of compounds through various weaves and thicknesses of reinforcement materials. They know the compatibility of commonly used resins, release agents and surface parting compounds, and are more skilled in avoiding problems such as air bubbles and pitting caused by the use of improper mixing and pouring techniques.

At this level, the plastic workers apply a broader knowledge of and skill in using low pressure shaping, forming, and casting techniques than grade 7 workers. For example, they plan and accomplish repair and manufacture of laminated items with more complicated and varied shapes, or damaged contours, or for which there may be a need to manufacture molds from a variety of materials such as plastic, plaster and synthetic rubber tooling compounds. They know how to make partial backup molds to reestablish proper contours of a damaged item; for example, they hand lay-up laminated female and/or male molds on an identical section of a serviceable part to obtain proper configurations. They are able to lay out and accomplish initial hand lay-up of laminated items on molds with sharp, irregular angles and combinations of curved and flat areas. This requires greater skill than is necessary at grade 7 in layout, proper reinforcement of angles and corners, and in the use of hand tools to accomplish lay-ups free of blisters, resin pockets, starved areas, wrinkles and voids. They are skilled in making flexible and rigid casting and potting molds from materials such as plastic and rubber tooling compounds using an available master part or pattern. For example, they make flat-back one piece, split one-piece, shelled flexible casting molds, and male, female and two-part laminated molds. They prepare lay-up boxes, mark parting lines and alignment points, and determine the location of and cut sprue and vent holes. At this level, they use a more extensive knowledge of the effects of forming, molding,

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shaping and curing processes on plastics to identify problems such as warpage of manufactured parts, voids, pin holes, pin bubbles, poor lamination results, adhesion of part to molds, crazing and incomplete cure; determine probable causes; and make necessary corrections and adjustments to cure times, temperatures and pressures, or mixing, deration and pouring techniques.

At this grade level, plastic workers are more skilled in reading, interpreting and applying directions related to the mixture, ratios, possible uses, and required cure times, temperatures and pressures of common plastic resins, compound materials, solvents and mold release agents than grade 7 workers. They are also more skilled in reading dimensions and sizes in drawings and blueprints to make templates used in marking, cutting and trimming of final products. In addition, they use the same types of equipment as are described at the grade 7 level, however they are more skilled in using them to meet more rigid appearance, thickness, shape, finish and test requirements.

Responsibility: The supervisor assigns work orally or through work orders accompanied by appropriate drawings or blueprints. The grade 9 workers must use more judgment in planning their work and determining equipment, procedures and sequence of operations. They determine the ratio of resin to compound ingredients, the cure cycle and equipment needed, and the proper repair and moldmaking techniques to be used. They are responsible for determining the cause of rejects, and for making corrections. The products of their work must meet more stringent requirements for size, appearance, proper contours and required mechanical and electrical properties than those at the 7 level. At this grade, they work with greater independence than the grade 7 workers in that their work is normally checked by the supervisor and/or a quality controller only after completion for conformance with job specifications and use of standard trade practices.

Physical Effort: Physical effort at this grade is the same as that described at [grade 7](#).

Working Conditions: Working conditions at this grade are the same as those described at [grade 7](#).

4352-10**PLASTIC FABRICATOR, GRADE 10****4352-10**

General: At this level, plastic fabricators develop templates, patterns, molds and form blocks in order to modify and fabricate plastic items, assemblies and models that have combined straight and curved surfaces, and that may be made of a number of interconnecting parts and components. The work at this level is more difficult to plan and lay out than at the 9 level because of the more numerous curves, angles and shapes, and the need to fabricate patterns and form blocks for the various interconnecting parts comprising the final items. The plastic fabricators use any of the accepted trade practices, processes and techniques to accomplish work assignments that may involve manufacturing scale and full-sized plastic models of weapons, mines, tanks, air and space craft, dummies and gas masks for training and demonstration purposes.

Skill and Knowledge: Grade 10 plastic fabricators apply a more indepth knowledge of the working characteristics of a wide range of plastics materials, as well as woods, rubbers, clays and plaster tooling compounds in order to determine and select or substitute the materials to be used in the manufacture of master patterns, molds and final items. Overall considerations involved in the selection of materials are dimensional and optical qualities desired and a need for efficient and economical production. For example, they determine what type of plastic, rubber, clay or plaster compound is needed based on temperature, cure, weight, compatibility, flexibility and time considerations; and what type, weight, density, weave and number of plies of reinforcement to use to obtain strength, stiffness, drape and bulk properties of molds and final parts.

The plastic fabricators at this level apply a thorough knowledge of the full range of low pressure shaping, forming and casting techniques in order to plan and layout plastic models, items and assemblies and to reproduce scale models of objects. For example, they interpret and check plans, blueprints and sketches; visualize the completed model or assembly; determine the type, shape and number of molds, form blocks and master patterns needed; select appropriate equipment and techniques; and plan the sequence of work. They are skilled in using segment and laminated methods of construction of wooden form blocks with curved, contoured surfaces for successive lay-up and/or thermoforming processes; cast and laminated techniques of fabricating plastic and rubber molds such as shelled multipiece molds requiring careful planning to insure proper joining of the sections and parting of the shell from the mold; and machining of wood and plastic sheet and tube stock. They select the most economical methods of mold construction and take steps to eliminate problems such as extreme undercut and high mass to thin pour situations. They know how to finish and smooth the master patterns to required dimensions, as well as how to fit and assemble fabricated parts by nailing, bonding, bolting, and inserting into proper position.

The grade 10 plastic fabricators are more skilled in the use of shop geometric and trigonometric formulas to calculate angles, radii, contours, center lines, surfaces and solids when laying out work than grade 9 workers. In addition, they are skilled in interpreting more complex blueprints, diagrams and in using a wide range of manufacturers' instructions and specifications in order to select or substitute plastics materials.

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The grade 10 plastic fabricators must be more skilled than grade 9 workers in marking and measuring master patterns and templates using scribes, dividers, protractors, squares and micrometers. In addition, they must be skilled in the setup and skillful operation of a variety of wood working equipment such as lathes, routers and milling machines, as well as the low pressure forming, molding and shaping tools and equipment described at the next lower level.

Responsibility: Grade 10 plastic fabricators receive assignments through work orders, plans, specifications and drawings. They work with greater independence than grade 9 workers in planning and laying out their work; devising needed patterns, forms and molds; planning sequence of operations; and selecting appropriate materials, tools and equipment, and techniques with a view toward using the most efficient and economical means possible. Completed work is subject to spot-check by the supervisor for use of acceptable standards of workmanship and conformance with specifications.

Physical Effort: Physical effort is the same as that described at [grade 7](#).

Working Conditions: Working conditions are the same as those described at [grade 7](#) except that the work at this level is typically performed in well heated and lighted shops, and the fabricators are not usually exposed to the possibility of falls.

4352-11**PLASTIC FABRICATOR, GRADE 11****4352-11**

General: At this level plastic fabricators plan, layout, modify and fabricate unconventional, one-of-a-kind plastic items for a one-time project or in support of experiment, developmental or testing activities with a minimum of supervision. They may work in close coordination with scientists, engineers, and doctors in determining the most feasible materials and means of manufacturing the items that typically consist of numerous compound curves and intersecting compound angles. Assignments, that may involve manufacturing prototype models of radomes, missiles, wings, ship hulls and full body casts, are more difficult to plan and layout than those at the 10 level due to the need to meet more complex and critical configurations and fits, and the need to adapt trade practices, methods and techniques to fit each new situation.

Skill and Knowledge: At this grade level plastic fabricators apply a thorough practical knowledge of the newest plastics and possible compound materials in order to recommend and/or select materials to be used for prototype and one-time items that usually require special or unusual physical or functional characteristics, such as extremely light weight products, minute detail reproduction, very high heat resistance combined with excellent machinability. They may experiment with different combinations and amounts of resins and other compounds materials, as well as with different cure cycles and temperatures in order to obtain the required characteristics for the final product. In comparison, grade 10 plastic fabricators are skilled in selecting materials based upon the information provided by manufacturers' instructions and specifications. In addition, grade 11 plastic fabricators must have an extensive knowledge of the properties and machining characteristics of a variety of tooling materials such as woods, plasters, clay and rubber compounds in the selection of material to be used in the moldmaking processes.

In comparison with the grade 10 plastic fabricators who use any of the accepted manufacturing methods and techniques, plastic fabricators at this grade level must adapt shop practices, methods and procedures, and use unorthodox processes to fit each new project. They are skilled at establishing manufacturing procedures for newly developed compound materials through experimenting with various manufacturing techniques, curing times, temperatures; and pressures. They are able to recommend changes to suggested methods of manufacture in order to simplify the manufacturing process, improve the functional characteristics of the item, and establish realistic fabrication requirements. They are able to plan and layout items with hard to define reference points and are skilled in manufacturing master patterns and molds with critical compound curves and intersecting compound angles.

In addition to skill requirements of plastic fabricators at lower levels pertaining to shop mathematics, plastic fabricators at this grade level must be able to use mathematics to calculate loads, fits, sizes, and weights not provided in instructions and blueprints, to overcome design flaws, and to layout more complex items.

The grade 11 plastic fabricators know how to make special jigs and holding fixtures for holding, machining and curing irregularly shaped parts. In addition, they are more skilled in the setup and

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operation of trade tools, equipment and measuring instruments described at the 10 level to fabricate more complex items to closer tolerances.

Responsibility: While the grade 10 plastic fabricators are responsible for determining the (best accepted method by which to accomplish prescribed tasks and their work is spot-checked to insure use of such methods and techniques, the grade 11 plastic fabricators operate with greater independence. Grade 11 plastic fabricators receive assignments that specify the desired final product, and are expected to use originality and ingenuity in devising changes to methods, materials and processes to solve fabrication, assembly, design and related problems. Their work is reviewed by the supervisor on the basis of meeting assigned objectives.

Physical Effort: Physical effort is the same as that described at [grade 7](#).

Working Conditions: Working conditions are the same as those described at [grade 10](#).